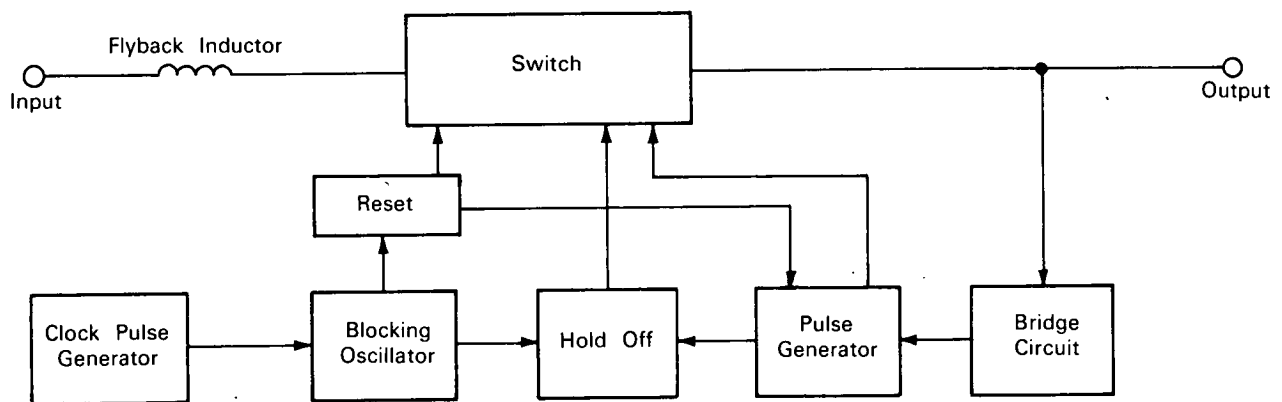


NASA TECH BRIEF



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Inductor Flyback Characteristic Gives Voltage Regulator Fast Response



The problem: To provide a regulated dc voltage to varying loads from a dc supply that varies over a wide range. The regulator must be capable of fast response to changes in both load and supply.

The solution: A regulator that alternately connects an inductor in parallel and in series with the input voltage source. When connected in parallel energy flowing into the inductor is stored in its magnetic core and, when connected in series, the stored energy is released to the output load at an increased voltage.

How it's done: The regulator consists of the flyback inductor, the switch that connects the inductor either in series or parallel with the input, and the associated circuitry that controls the switch.

The clock pulse generator provides the reference signal for the regulator. It produces a constant-frequency square wave at a frequency which is proportional to the regulator supply voltage. Thus, frequency regulation is achieved through supply voltage regulation. The clock pulse generator produces a positive-going square wave at a time when the inductor is in parallel

with the unboosted voltage input. The square wave is differentiated and the positive spike fires the blocking oscillator. This activates and controls the reset, and also turns on the hold off. The reset sends a signal to the switch which places the inductor in series with the input. It also sends a signal to the pulse generator to inhibit it. When the inductor is placed in series with the input, a signal to the blocking oscillator turns it off which turns off the reset. At this time the switch attempts to place the inductor back in parallel, but this is prevented by the hold off. When the reset was turned off, a capacitor in the pulse generator began to charge, via the bridge circuit, at a rate inversely proportional to the output voltage. When the capacitor charges to a predetermined value, the pulse generator fires the hold off, removing the hold from the switch and placing the inductor back in parallel with the input. The regulator is now back in its original condition and the process is repeated.

Notes:

1. This innovation could be of general interest in the design of voltage regulators.

(continued overleaf)

2. Further information concerning this innovation is presented in NASA TN D-2627, "Flyback Voltage Regulator" by Gail D. Smith, February 1965, available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151; price \$1.00. Inquiries may also be directed to:

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Reference: B65-10257

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated by NASA.

Source: (GSFC-361)